CLAIMS

1. An ophthalmic refractometer (13) for objective determination of the refractive power of an eye (A), comprising an optometer system for imaging a test mark on the retina of the eye (A) and comprising an observation system (15) for observation of the test mark (18) imaged on the retina, whereby the optometer system and the observation system can be adjusted in mutual synchronization in relation to a reference position, and whereby a refractive power parameter of the eye (A) can be determined from the difference between the reference setting and the setting at which the test mark (18) is imaged on the retina with at least some sharp contours,

characterized in that a digital recording device (42) and a digital processing unit are provided on the observation system, whereby digital image data of the test mark (18) imaged on the retina can be recorded with the recording device and the image data thus obtained can be analyzed in the image processing unit by digital image processing to determine the refractive power parameter.

2. The ophthalmic refractometer according to Claim 1, characterized in that the digital recording device (42) is designed in the manner of a CCD chip.

3. The ophthalmic refractometer according to Claim 1 or 2, characterized in that a linearly adjustable adjusting unit (27) is provided for synchronous adjustment of the optometer system and the observation system, a first deflecting element (23) which is situated in the beam path (14) of the optometer system and a second deflector element (38) which is situated in the beam path (15) of the observation system being mounted thereon, so that by adjusting the adjusting unit (27),

the length of the beam path (14) in the optometer system and the length of the beam path (15) in the observation system are varied in mutual synchronization.

4. The ophthalmic refractometer according to Claim 3, characterized in that the first deflecting element (23) and/or the second deflecting element (38) each have two reflective elements (24, 25; 39, 40) which are arranged in the beam path (14) of the optometer system and/or in the beam path (15) of the observation system, so that a path is formed resembling a trombone slide, suitable for varying the length of the beam path (14) in the optometer system and/or the length of the beam path (15) in the observation system.

5. The ophthalmic refractometer system according to Claim 3 or 4, characterized in that the first deflecting element (23) and/or the second deflecting element (38) are adjustably mounted on the adjusting element (27).

6. The ophthalmic refractometer according to one of Claims 3 through 5, characterized in that the first deflecting element (23) and/or the second deflecting element (38) are mounted on the adjusting unit (27) with a mutual offset (43), so the length of the beam path (14) in the optometer system between the test mark (18) and the eye (A) corresponds exactly to the length of the beam path (15) in the observation system between the eye (A) and the digital recording unit.

7. The ophthalmic refractometer according to one of Claims 3 through 6, characterized in that the adjusting unit (27) can be adjusted using a servomotor (31).

8. The ophthalmic refractometer according to one of Claims 3 through 7, characterized in that the position of the adjusting unit (27) can be detected with a sensor, whereby a zero position of the adjusting unit (27) defines the reference position of the ophthalmic refractometer (13), and the position of the adjusting unit (27) measured by the sensor is relayed to an analyzer unit, where it can be analyzed as a current setting of the ophthalmic refractometer (13) in relation to the reference position.

9. The ophthalmic refractometer according to Claim 8, characterized in that the position of the adjusting unit (27) can be detected by analysis of the position of the servomotor (31).

10. The ophthalmic refractometer according to one of Claims 7 through 9, characterized in that the servomotor (31) can be operated as a stepping motor for adjusting the adjusting unit (27) in equidistant increments.

11. The ophthalmic refractometer according to one of Claims 1 through 10, characterized in that a contour image having midpoint symmetry, where a plurality of contour transitions (49) extend outward from the midpoint, is used as the test mark (18).

12. The ophthalmic refractometer according to one of Claims 1 through 11, characterized in that the test mark (18) has a plurality of light fields (47) and dark fields (48) arranged in alternation.

13. The ophthalmic refractometer according to one of Claims 1 through 12, characterized in that an LED lighting device (16) for illuminating the test mark (18) is provided on the optometer system.

14. The ophthalmic refractometer according to one of Claims 1 through 13, characterized in that at least two lenses (21, 22; 36, 37) arranged in a stationary mount are provided in the beam path (14) of the optometer system and/or in the beam path (15) of the observation system.

15. The ophthalmic refractometer according to Claim 14, characterized in that the lenses (21, 22; 36, 37) are mounted on a common carrier element (20, 35) so that the lenses (21, 22; 36, 37) are arranged in the area of the part of the beam (14, 15) resembling a trombone slide.

16. The ophthalmic refractometer according to one of Claims 1 through 15, characterized in that a device (44) for applying a fixation mark to the eye (A) is provided.

17. The ophthalmic refractometer according to one of Claims 1 through 16, characterized in that a device (44) for direct observation of the eye (A) by a person performing the test is provided.

18. The ophthalmic refractometer according to one of Claims 1 through 17, characterized in that a fixation light is provided for fixation of the eye in a position in which the fundus of the eye, in particular the nerve fiber head, can be recorded with the observation system.

19. A method of operating an ophthalmic refractometer (13) for objective determination of the refractive power of an eye (A) comprising an optometer system for imaging a test mark (18) on the retina of the eye (A) and comprising an observation system for observation of the test mark (18) imaged on the retina of the eye (A), whereby the optometer system and the observation system can be adjusted in mutual synchronization and in relation to a reference position and whereby a refractive power parameter of the eye (A) can be determined from the difference between the reference position and the position at which the test mark (18) is imaged on the retina with at least partially sharp contours, characterized in that

- at different settings of the optometer system and the observation system, multiple digital image data records are recorded using a digital recording device (42) and are stored together with the particular assigned adjustment parameters of the optometer system and the observation system, whereby each individual image data record represents the test mark (18) imaged on the retina at the particular setting;

- the image data records are analyzed by digital processing in an image processing unit to assign a contour sharpness evaluation to each image data record;

- the contour sharpness evaluations of the image data records are analyzed in an analyzer unit to ascertain the settings at which relative maximum values (45, 46) for the contour sharpness evaluation are obtained;

- a refractive power parameter is determined in the analyzer unit from the difference between the reference setting and the settings at which there are relative

maximum values (45, 46) for the contour sharpness evaluation.

20. The method according to Claim 19, characterized in that the image data records having the two highest relative maximum values (45, 46) for the contour sharpness evaluation are determined in the analyzer unit, and the refractive power parameters in the two main refractive power axes are derived from the corresponding assigned settings.

21. The method according to Claim 19 or 20, characterized in that a contour image having a plurality of contour transitions (49) extending outward from a midpoint is used as the test mark (18), and an image data record having a particularly low maximum value (46) for the contour sharpness evaluation is analyzed in the image processing unit, said contour transition (49a) of the test mark (18) having the maximum contour sharpness is imaged and the angle of inclination (α) of the main refractive power axes with respect to the horizontal and/or vertical is derived from the angular difference (γ) between this contour transition (49a) and the vertical or horizontal respectively.

22. The method according to Claim 19, characterized in that

- by means of a fixation light, the eye is fixed in a position in which the nerve fiber head can be observed by the observation system;
- multiple digital image data records are recorded at different settings of the observation system using the digital recording device and these image data records are stored together with the setting parameters of the

observation correlated with them, whereby each individual image data record represents the nerve fiber head as observed in the particular setting;

- in an image processing unit the image data records are analyzed by digital image processing so that a contour sharpness evaluation can be assigned to each image data record;

- in an analyzer unit the contour sharpness evaluations of the image data records are analyzed to ascertain the settings at which relative maximum values for the contour sharpness evaluation are obtained;

- the depth of the excavation of the nerve fiber head is determined in the analyzer unit from the difference between the settings at which relative maximum values for the contour sharpness evaluation are obtained.